



CENTRAL VALLEY REGIONAL  
WATER QUALITY CONTROL BOARD

# Sediment Toxicity Testing in the San Joaquin River Basin

Surface Water Ambient Monitoring Program  
(SWAMP)

San Joaquin River Basin

***Draft July 2007***



CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY



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REGIONAL WATER QUALITY CONTROL BOARD  
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## TABLE OF CONTENTS

## PAGE

1.0 EXECUTIVE SUMMARY.....	vii
2.0 INTRODUCTION.....	1
3.0 STUDY AREA.....	1
4.0 SAMPLING PROGRAM.....	2
4.1 Sampling Locations and Frequency.....	2
4.2 Field Methods.....	6
4.3 Laboratory Methods.....	6
5.0 DATA ANALYSIS CRITERIA.....	6
6.0 RESULTS.....	8
6.1 Sediment Toxicity.....	8
6.2 Sediment Particle Size and Total Organic Carbon.....	8
7.0 ADDITIONAL STUDIES.....	10
7.1 Pesticide Analysis.....	10
7.2 Toxicity Identification Evaluations.....	11
7.3 Del Puerto Creek Upstream Study.....	11
7.4 Roberts Island.....	14
8.0 SUMMARY/DISCUSSION.....	15
9.0 CONCLUSION.....	17
10.0 REFERENCES.....	18

## LIST OF TABLES

## PAGE

Table 1. Total number of sediment toxicity samples collected in each SJR sub-basin.....	2
Table 2. Sampling site information for the San Joaquin River Basin Sediment Toxicity Project.....	3
Table 3. Sampling matrix for the San Joaquin River Basin Sediment Toxicity Project for sediment toxicity testing only.....	5
Table 4. Criteria used for assigning toxicity categories.....	7
Table 5. Range and mean for fine particle size and TOC.....	8
Table 6. Summary of sediment toxicity testing mean survival results.....	9
Table 7. Samples with detections of chlorpyrifos and diazinon.....	10
Table 8. Samples with detections of pyrethroid pesticides.....	10
Table 9. Del Puerto Creek Upstream Sediment Study results: 28 October 2002.....	11
Table 10. Summary of sediment toxicity results and select chemical analysis for each TIE.....	12
Table 11. Mean survival of <i>H. azteca</i> for all Westside sub-basin samples, including TIE toxicity results.....	15

## LIST OF FIGURES

Figure 1. San Joaquin River Basin Sediment Toxicity Project sampling locations.....	4
Figure 2. Sampling locations for the Del Puerto Creek Upstream Study.....	13

## APPENDICES

Appendix A. Sediment Data.....	20
A-1: Sediment toxicity, particle size, and TOC.....	21
A-2: Sediment pyrethroid pesticide results.....	25
A-3: Organophosphate pesticide results.....	28
Appendix B. Toxicity Identification Evaluations.....	33
B-1: Del Puerto Creek at Vineyard Road, May 29, 2002 and September 11, 2002 sampling events.....	34
B-2: Ingram Creek at River Road, November 13, 2003 sampling event.....	42
B-3: Ingram Creek at River Road, September 13, 2004 sampling event.....	47
B-4: Hospital Creek at River Road, March 30, 2005 sampling event.....	52
B-5: Grayson Road Drain, June 15, 2005 sampling event.....	61
B-6: Westly Wasteway near Cox Road and Del Puerto Creek near Cox Road, October 10, 2005 sampling event.....	70

## 1.0 EXECUTIVE SUMMARY

Pyrethroid pesticide use in Stanislaus, Merced and San Joaquin Counties has shown a 24% increase from 2000 to 2005, according to the Department of Pesticide Regulation Pesticide Use Report. Pyrethroid pesticides tend to accumulate in areas with finer sediments and organics at levels toxic to *Hyella azteca* (*H. azteca*). To assess the potential for sediment toxicity in the San Joaquin River (SJR) Basin, sediment samples were collected from October 2001 through September 2005 and analyzed for sediment toxicity, specific pesticides, and/or submitted for Toxicity Identification Evaluations (TIEs). The objectives of this sediment toxicity project were to determine if sediment toxicity was evident in the SJR Basin; identify areas with persistent sediment toxicity; and attempt to identify the causes of identified toxicity.

Sampling locations were selected based on existing Surface Water Ambient Monitoring Program (SWAMP) sampling locations in the SJR Basin. The SWAMP effort divided the SJR Basin into six sub basins: Northeast, Eastside, Westside, Southeast, Grassland, and Delta Basins, with representative trend monitoring sites for each. The majority of sampling sites for this Sediment Toxicity Project focused on the long-term trend sites within three sub-basins (Eastside, Northeast, and Westside) where water quality sampling occurred monthly between October 2001 and October 2005. A total of 73-sediment samples were analyzed for toxicity to the amphipod *H. azteca*. After April 2003, specific areas with known pyrethroid use were targeted due to the increased associations of this class of pesticide with the potential for sediment toxicity. Targeted sampling included analysis for organophosphate and pyrethroid pesticides as well as funding of TIEs. In addition, sediment was collected to augment a special study for the Department Pesticide Regulation evaluating impacts from agricultural pesticide use and analyzed for sediment toxicity.

Statistically significant toxicity to *H. azteca* occurred in 19 of 73 samples (26%) collected during the project. The majority of mortality to *H. azteca* occurred in water bodies located in the Westside sub-basin. Toxicity to *H. azteca* was statistically identified in 18 of the 20 samples (90%) collected in the Westside sub-basin. Samples that showed toxicity ranged from 0% to 65% survival, with 13 out of the 18 toxic samples having less than 50% survival and categorized as highly toxic. Due to the frequent sediment toxicity found at Del Puerto Creek at Vineyard Road (STC516), an upstream study was completed on 28 October 2002 to assess if pesticides were present and determine the potential extent of the sediment toxicity upstream of STC 516. Sediment was collected at 4 sites and 3 of the 4 sites reported less than 50% survival. Bifenthrin (a pyrethroid pesticide) was detected at STC516 at a concentration of 7.5 ng/g (Bifenthrin sediment LC 50 is 12.9 ng/g), while the associated sediment toxicity resulted in a 5% survival of *H. azteca* and was categorized as highly toxic. In addition, eight TIEs were completed on Westside sub-basin sites. The majority of TIEs indicated pyrethroids as the cause of toxicity (5 out of 8 TIEs). Non-pyrethroid compounds were identified as the likely cause of toxicity in 3 out of the 8 TIEs. These compounds included DDT, chlorpyrifos, and organic contaminants.

The majority of samples collected in this project focused on *H. azteca* toxicity testing. Out of 24 toxic samples, additional analysis in 9 samples (chemical analyses and TIEs) indicated pyrethroids, DDT, organic contaminants, and/or a combination of these compounds were responsible for the toxicity. Follow up studies are recommended to assess the remaining unknown sediment toxicity identified during the project and the impact of pyrethroids not just in the SJR Basin, but also throughout the Central Valley.

Ongoing activities related to sediment toxicity in the SJR Basin include:

- Monitoring conducted under the Central Valley Regional Water Quality Control Board Irrigated Lands Program
- State Water Resources Control Board Agreement #06-152-555-0 titled “Transport Processes of Pyrethroid Insecticides in Streams and Rivers of the San Joaquin Basin”.
- State Water Resources Control Board Agreement #06-278-555-0 titled “Reducing Unexplained Toxicity to Protect Sediment Quality Associated with Agriculture”.

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